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(54) Package comprising at least two substantially rectangular flexible packs of compressed articles

(57) The invention relates to a package comprising an array of flexible packs (5). Each pack comprises compressed flexible articles, such as disposable diapers. A flexible wrapper (19) forms a tube extending along the side faces of the array and being folded onto

the top face of the array to provide a shape-stable configuration. Attachment means (41) keep the wrapper in its folded over configuration.

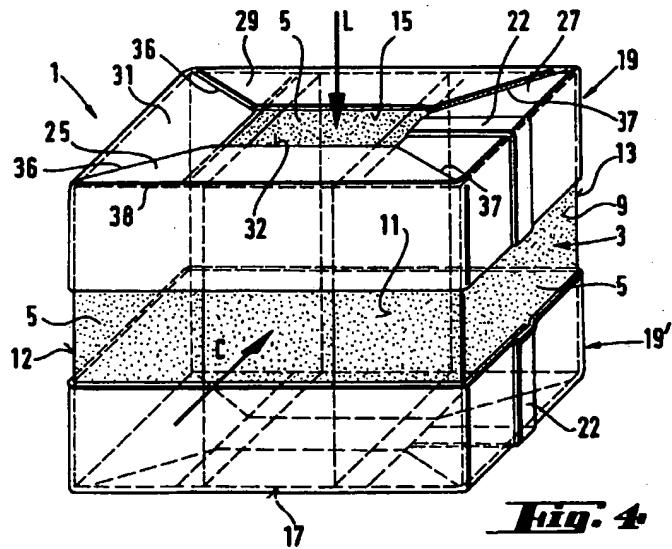


Fig. 4

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**Description****Field of the Invention**

The invention relates to a package comprising an array of at least two substantially rectangular flexible packs, each pack comprising flexible articles which have been compressed in a direction of compression to between 20% and 70% of their uncompressed volume encased in a flexible bag. The array comprises four side faces, a top face and a bottom face, and a wrapper wrapped around at least a part of the side faces of the array.

It is known to pack a plurality of flexible diaper bags in cardboard boxes. These boxes provide shape-stable packages which protect the diaper bags during transport and storage. A problem encountered when packing a number of flexible bags in a cardboard box is that due to dimensional variations of the bags, the box has to be larger than the actual dimensions of its contents. In general, the cardboard box is about 4 standard deviations larger than the average dimension of the bags. When the cardboard boxes containing the bags are stacked, the empty space in the cardboard boxes may cause the boxes to collapse and the stacks to topple. To provide the cardboard boxes with sufficient stability, these boxes are made of relatively thick material.

Furthermore, when the diaper bags are put onto the shelves of a store, the cardboard boxes are removed, which gives rise to a relatively large amount of waste cardboard. After removal of the cardboard boxes, it is often difficult to arrange the unpacked bags into a display configuration for sale.

A package comprising flexible packs is known from WO 94/00362. In this patent application a number of flexible diaper bags is formed into a package by means of detachable adhesive tapes, that are attached to each bag. The package containing multiple bags can be transported and stored as a unit, and a single bag can be dispensed from the package by detaching the tapes from the diaper bag that is to be taken from the package, and re-attaching the adhesive tape to the remaining diaper bags.

The packaging of multiple diaper bag using adhesive tapes facilitates placing the diaper bags into a display and sale configuration. Consumers can carry home a single package containing multiple diaper bags, or may take separate bags from the package. A disadvantage of the diaper packs comprising adhesive tapes is that the packaging method leaves the diaper bags relatively exposed. This may lead to damage to the polyethylene bags during storage or transport. Furthermore, the adhesive tapes provide relatively little support or reinforcement for the bags during storage. When stacking the diaper bags that are attached by the adhesive tapes, these bags may bulge or otherwise deform which may cause a stack of packs to topple over. Finally, upon removal of the tapes from the diaper bags, the printing on the bags or the bag material may be damaged.

It is an object of the present invention to provide a package comprising flexible bags which can be easily applied and removed.

It is another object of the present invention to provide a package which protects and supports the flexible bags and which can be stacked in a stable configuration with other packages.

It is again another object of the present invention to provide for a package which is of economic construction and results in relatively little waste.

A package according to the present invention comprises a flexible wrapper which forms a tube having a tube section extending beyond the top face of the array of flexible bags. The tube section is folded transversely to the side faces to at least partly cover the top face and of the array of flexible bags. Attachment means maintain the folded-over tube section in its folded-over position.

The wrapper according to the invention forms a band around the side faces of the flexible diaper bags which keeps the flexible bags together in a stable array. It has surprisingly been found that in this simple manner, the bags containing compressed flexible articles can be formed into shape-stable packages. The folded-over section of the tube forms a flat, reinforcing element on either the top surface, the bottom surface or both surfaces of the array which is maintained in its substantially rectangular shape by the wrapper. The array can be stacked in a stable manner.

The term "tube" is intended to mean a closed, or endless band of flexible material. The diameter of the tube may be larger or smaller than the height of the tube. The cross-section of the tube is substantially rectangular and has slightly rounded corners.

The term "flexible wrapper" is intended to mean a wrapper that can be easily bent or draped without substantial folding or creasing. An example of a flexible material is paper of a basis weight below 200 g/m<sup>2</sup>, preferably in the range of 80 g/m<sup>2</sup> - 130 g/m<sup>2</sup>.

By forming the bags in an array by means of a flexible wrapper instead of by a cardboard box of fixed dimensions, variations in the dimensions of the bags can be easily compensated for during the packaging process, which can be carried out at an increased speed versus conventional packaging processes.

In case the flexible articles are formed by disposable diapers, the outer dimensions of a package according to the invention can be reduced by about 15 % compared to package comprising a cardboard box as an outer casing. When the packages of diaper bags according to the invention are put on a pallet of fixed dimensions, more diaper bags can be stacked than is possible when the diaper bags are packed in cardboard boxes, hence optimising the use of transport and storage space.

The flexible wrapper protects the side faces and top and bottom faces of the array of bags during storage and transport and can be easily removed from the diaper bags when these are put on the shelves in a store. When a stack of a number of packages according to the

invention, comprising for instance diaper bags, is put up for sale, the wrapper can be easily removed from for instance the top most packages in such an array and results in relatively little waste.

In an embodiment according to the invention, the wrapper causes an additional compression of the array of bags in the direction of compression between 0.5% and 10%, preferably between 3 % and 7 % of the dimension of the array without the wrapper. By tightly wrapping the wrapper around the diaper bags such that an additional compression of the bags occurs, the stability of the array is improved without deterioration of the substantially rectangular shape of the array.

By adjusting the degree of compression of the wrapper during the packaging process, dimensional variations between different arrays may be compensated for to obtain arrays of a constant outer dimension.

In a preferred embodiment, a first tube section of the wrapper extends beyond the top face of the array of flexible bags and is folded onto the top face. A second tube section extends beyond the bottom face, and is folded onto the bottom face, wherein the first and second tube sections are mutually separate parts. Each tube section forms a tray member, one of which can be removed when the packages are placed in a display-and-sale configuration.

Especially stable arrays of clearly defined outer dimensions are formed when the wrapper is formed by a relatively unextensible material, such as a paper of a basis weight between 80 g/m<sup>2</sup> and 130 g/m<sup>2</sup>. Preferably the wrapper extends not more than 5 %, most preferably not more than 0.5 % in length upon application around the array of bags.

#### Brief Description of the Drawings

The invention will be described in detail with reference to the accompanying drawings. In the drawings:

Figure 1 shows a pack comprising compressed flexible articles in a flexible bag,

Figure 2 shows an array comprised of three bags of the type as shown in figure 1, held together by a flexible wrapper,

Figure 3 shows a top plan view of the package of figure 2,

Figure 4 shows an array of three flexible bags held together by an upper and a lower wrapper,

Figure 5 shows an embodiment wherein the wrapper extends along a major part of the side faces of the flexible bags,

Figure 6 shows an embodiment wherein the wrapper covers the bottom and top surfaces of the array of flexible bags, the wrapper being provided with a

line of perforations and/or windows or slits,

Figure 7 shows an embodiment wherein both the side faces and the top and bottom faces of the array of flexible bags are covered by a wrapper according to the invention, and

Figure 8 shows an embodiment wherein the arrays of flexible articles are compressed by the wrapper between by 0.5 and 10 percent of the uncomplicated dimension of the bags.

#### Detailed Description of the Invention

Figure 1 shows a flexible pack 5 comprising a flexible polyethylene bag 4 containing compressed absorbent articles 7. The absorbent articles 7 may comprise disposable diapers, incontinence pads or incontinence briefs, sanitary napkins and the like. The articles 7 are compressed to between 20 and 70 percent of their uncompressed volume in a direction of compression, indicated as C. Compression forces acting upon the absorbent articles during compression may range between 1000 and 2000 kg.

In the bag 4 of figure 1, disposable diapers are comprised, the direction of compression, C, corresponding to the longitudinal dimension of the bag 4. Between 10 and 50 compressed diapers may be comprised in the bag 4. The diapers may be solely comprised in a flexible bag which is made of for instance polyethylene of a thickness of between 30 and 120 micrometer.

During transport and storage, the diaper bags 4 will be stacked such that a load L is applied to a top face of the bags or to a side face, such that the direction of the load is perpendicular to the direction of compression C. The diaper bags 4 are relatively incompressible in directions perpendicular to the direction of compression C.

In another embodiment, such as described in EP-A-0 618 148, an additional paper sleeve is wrapped around the diapers to take up the expansion force. A flexible bag is placed around the sleeved stack of diapers. A method of compression packing of diapers into flexible bags has been described in detail in US-patents No's 4,934,535, 4,966,286, 5,022,216, 5,050,742 and 5,150,561.

Figure 2 shows a partially completed package 1 according to the invention comprising an array 3 formed by three flexible packs 5 of the type as shown in figure 1.

A flexible wrapper 19 is wrapped around the side faces 9, 11 of the array 3. The wrapper 19 is formed by a flexible material such as paper or a thermoplastic film and forms a tube. The wrapper 19 is maintained in a tubular configuration by a seam 20. The wrapper 19 comprises a tube section 21 which extends beyond the top surface 15 of the array 3, which has a height indicated by H in figure 2. The tube section 21 of tubular wrapper 19 comprises 4 subsections 25, 27, 29 and 31. The tubular wrapper 19 extends along a length H' of the

height H of the array. The length H' comprises at least 30 % of the height H in order to obtain a stable package.

Each subsection 25, 27, 29 and 31 is bounded by corner fold lines 40. The tube sections 25 and 29 comprise two diagonal fold lines 36 and 37 extending from the corner fold lines 40 to a free edge 32. The two subsections 27 and 31 are folded along the fold line 38 which coincides with the upper peripheral edge of the array 3. The subsections 25 and 29 are folded along the foldline 38 and along the diagonal foldlines 36 and 37. Preferably the wrapper 19 does not extend more than 5 %, more preferably not more than 0.5 % of its length upon wrapping around the array 3 of bags.

Figure 3 shows a top plan view of the array 3 after folding-over the tube section 21. The sub sections 25, 27, 29 and 31 of the wrapper 19 are maintained in an overlapping position by means of patches of adhesive 41. The adhesive 41 may comprise a hot melt adhesive or a pressure sensitive adhesive as supplied by the Findley Company. Instead of adhesive attachment, the wrapper may be maintained in a folded configuration by means of welding, heat sealing or adhesive tapes.

The area of the top face 15 of the array 3 that is covered by the tube section 21 can be varied by varying the length by which the tube section 21 extends beyond the top surface 15 of the array 3.

A method of attaching the wrapper 19 around the packs 5 may be derived by modifying the process described in EP-B-0477427. In this patent it is described that carton boxes may be packed by a wrapper which is folded onto the top or bottom faces of an array of boxes. It has been surprisingly found that such a method can be employed for packaging flexible packs into shape-stable packages.

Figure 4 shows an embodiment wherein the array 3 of flexible packs 5 comprises a wrapper 19 across the top surfaces 15 and a similar wrapper 19' covering the bottom surface 17. The packages 1 according to the invention can be stacked one onto the other as the folded over tube sections 21 stabilise the load bearing surfaces of the packages. The package of figure 4 allows compaction of the package in the direction of the loading force, L, without loss of stability of the package. This is so because both wrappers 19, 19' can move in the direction of the loading force L allowing contraction and expansion of the flexible packs without causing additional strain or slack in the wrappers.

The packages 1 form an attractive display configuration as the packs 5 are still visible without removal of the wrappers 19 and 19'. A stack of packs 5 can be placed in a sales configuration by removing the wrappers 19 from the topmost packs 1 in such a stack. This can be done by simply lifting off the wrapper 19, which forms a tray-like member.

Figure 5 shows an embodiment of a package 1 wherein a single flexible wrapper 19 extends across a relatively large part of the side faces 9, 11 of the array 3. It has been found that in order to obtain a shape-stable package, at least 30 % of the height of the array 3 is to

be covered by the wrapper 19, but that a height N of about 5 % of the height H needs to remain to remain uncovered to allow for compaction of the bags in the direction of the load L.

Figure 6 shows an embodiment wherein the array 3 is completely enwrapped in a single wrapper 19 covering the top surface 15 and the lower surface 17 of the array 3. The side surfaces 9 and 11 of the wrapper 19 maybe provided with a slit 43 or a line of perforation 45, for easy removal of the wrapper 19.

Figure 7 shows an embodiment wherein the package 1 comprises four wrappers 19, 19', 20, 20', covering the top and bottom faces 15 and 17 and the side faces 9 and 12 of the array 3.

In the embodiment of figure 8, the wrappers 19, 19' compress the array of absorbent articles between 0.5 and 10 per cent. The degree of compression may for instance be measured by comparing the dimension L2 with the dimension L1 in figure 8 and taking for the degree of compression:  $(L_2 - L_1) / L_2$ .

It has been found that by providing an additional degree of compression by application of the wrappers 19, 19', the shape stability of the array is improved. An array comprising 3 bags each containing 28 compressed diapers, at about 48 % compression, each bag measuring 27 cm x 16.5 cm x 10.5 cm was able to bear a load of about 1400 N in the direction L before becoming unstable.

In a package according to the invention multiple diaper bags may be placed one onto the other. The wrapper 19 should have in such a sufficient height H' to cover at least 30 % of the height of each individual bag and should cover at least 50 % of the total height of the stacked bags. In a preferred embodiment, the wrapper 19 is completely or partially transparent to display the print of the bags 4.

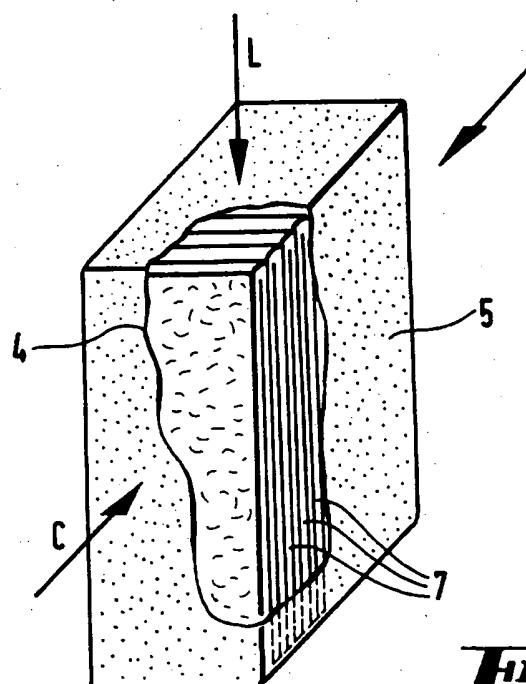
## Claims

### 40. 1. Package (1) comprising

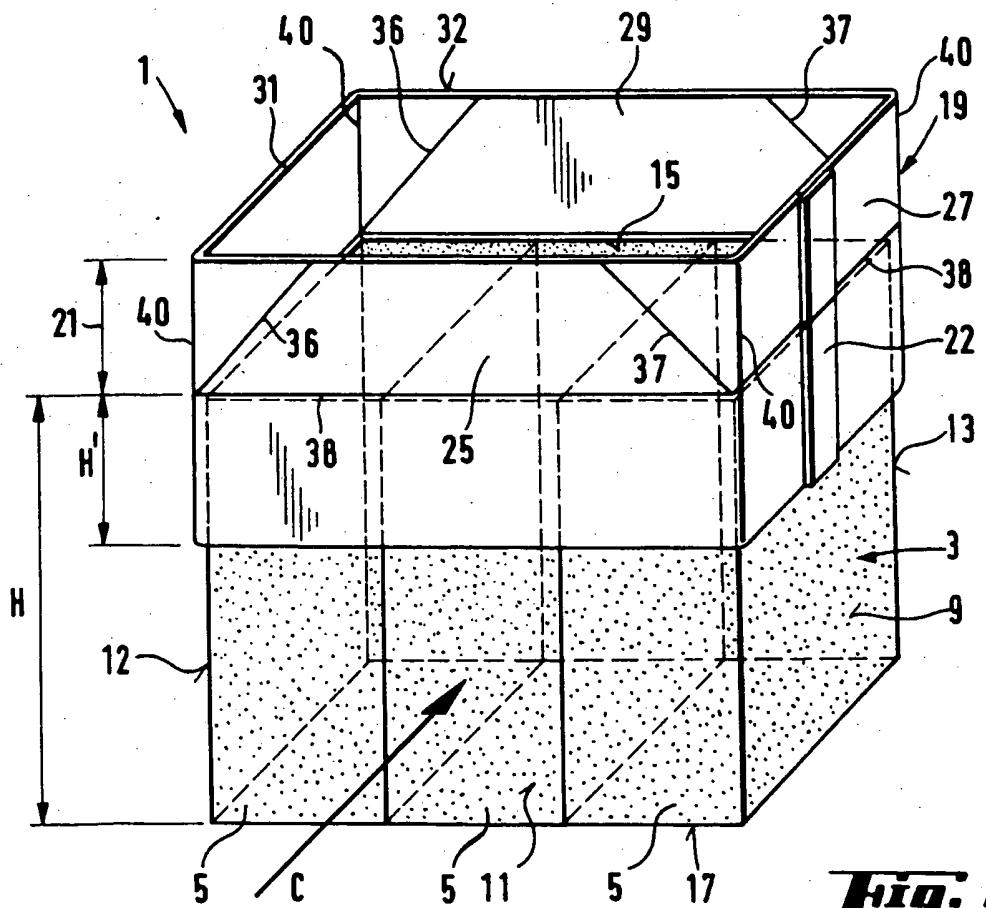
- an array (3) of at least two substantially rectangular flexible packs (5), each pack comprising flexible articles (7) which have been compressed in a direction of compression to between 20% and 70% of their uncompressed volume encased in a flexible bag (4), the array (3) comprising four side faces (9,11,12), a top face (15) and a bottom face (17),
- a flexible wrapper (19,19',20,20') wrapped around at least a part of the side faces of the array, the wrapper forming a tube having a tube section (21) extending beyond the top face (15) of the array, the tube section being folded transversely to the side faces (9,11,12) to at least partly cover the top face (15), and

attachment means (41) for maintaining the

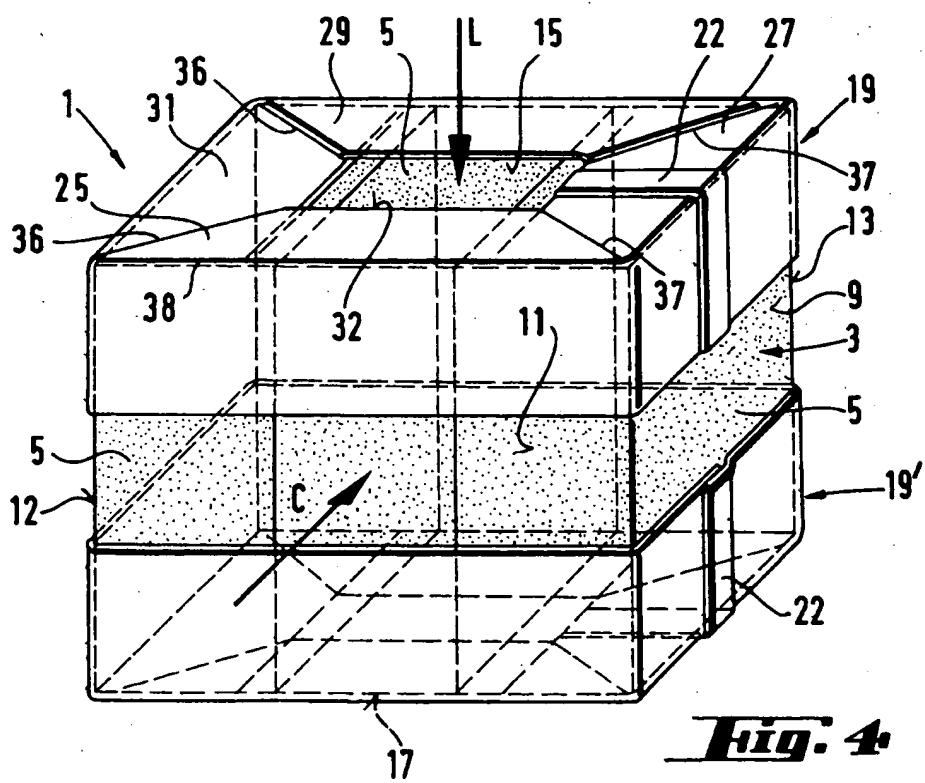
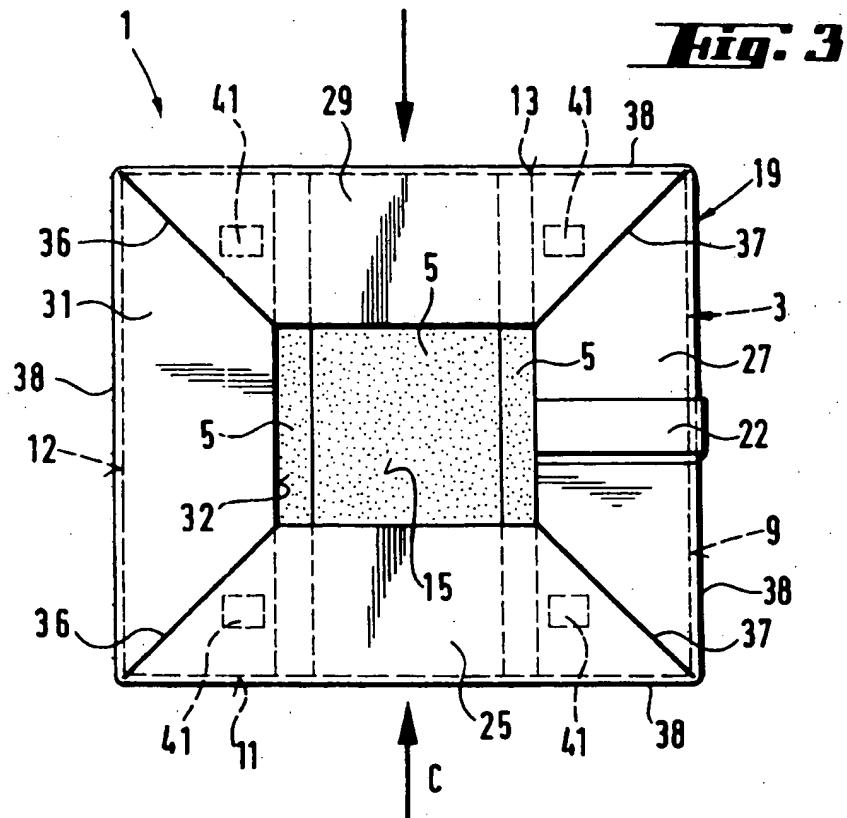
- folded-over tube section (21) in its folded over position.
2. Package according to claim 1, wherein the top face (15) of the array is generally parallel to the direction of compression. 5
3. Package according to any of the previous claims, wherein the wrapper (19,19',20,20') comprises a relatively unextensible material, which does not extend more than 5 %, preferably not more than 0.5 % in length upon wrapping around the array (3). 10
4. Package (1) according to claim 1, 2 or 3 wherein the wrapper (19,19',20,20') causes an additional compression of the array (3) in the direction of compression of the articles (7) between 0.5% and 10% of the dimension of the array (3) without the wrapper. 15
5. Package (1) according to any of the previous claims, wherein the tube section (21) comprises four substantially rectangular subsections (25,27,29,31), each subsection comprising a free edge (32) and being bound by two corner fold lines (40) extending parallel to the side faces (9,11,12) towards the free edges (32), an oppositely located first and second subsection (25,29) each comprising two diagonal fold lines (36,37) extending from the corner fold lines (40) to the free edge (32) of each subsection, wherein oppositely located third and fourth subsections (27,31), are folded parallel to the top face (15) of the array (3) along their corner fold lines (40), the first and second subsections (25,29) being folded parallel to the top face (15) of the array along their corner fold lines (40) and along their diagonal fold lines (36,37). 20  
25  
30  
35
6. Package (1) according to any of the previous claims, wherein the first and second subsections (25,29) are adhesively attached to the third and forth subsections (27,31). 40
7. Package (1) according to any of the previous claims, wherein a first tube section of the wrapper extends beyond the top face and is folded onto the top face and a second tube section extends beyond the bottom face, and is folded onto the bottom face. 45
8. Package according to claim 7, wherein the first and second tube sections are mutually separate parts. 50
9. Method according to any of the previous claims wherein the wrapper (19,19',20,20') comprises paper of a basis weight smaller than 200 g/m<sup>2</sup>. 55
10. Method according to any of the previous claims wherein the wrapper (19, 19', 20, 21') extends along at least 30 % of the height of the array (3).

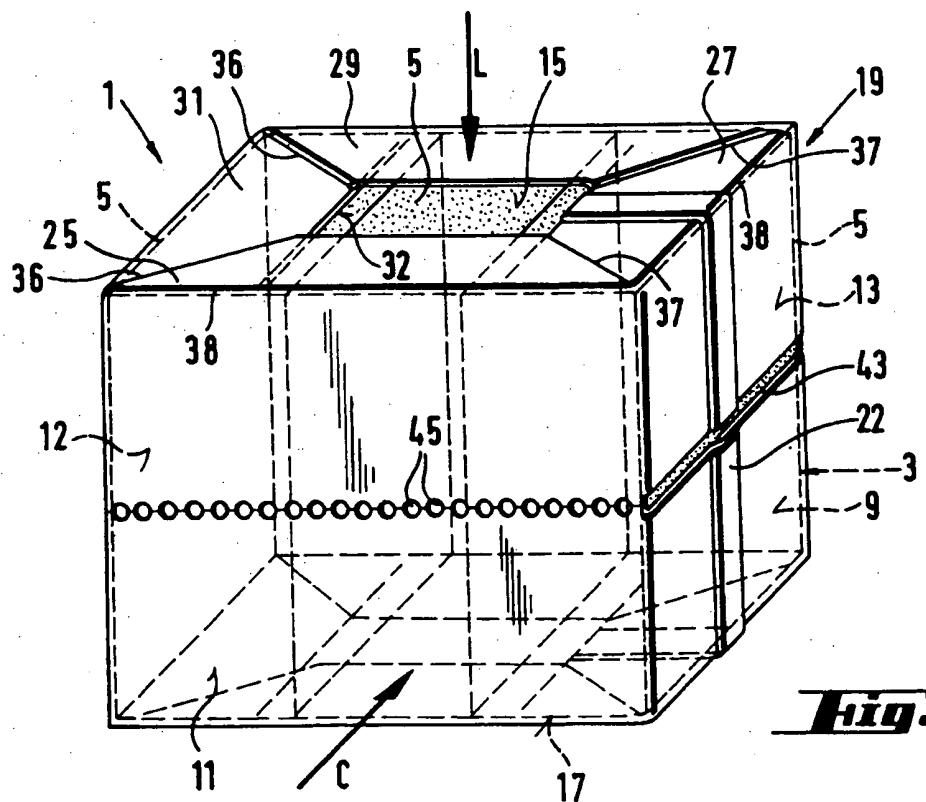
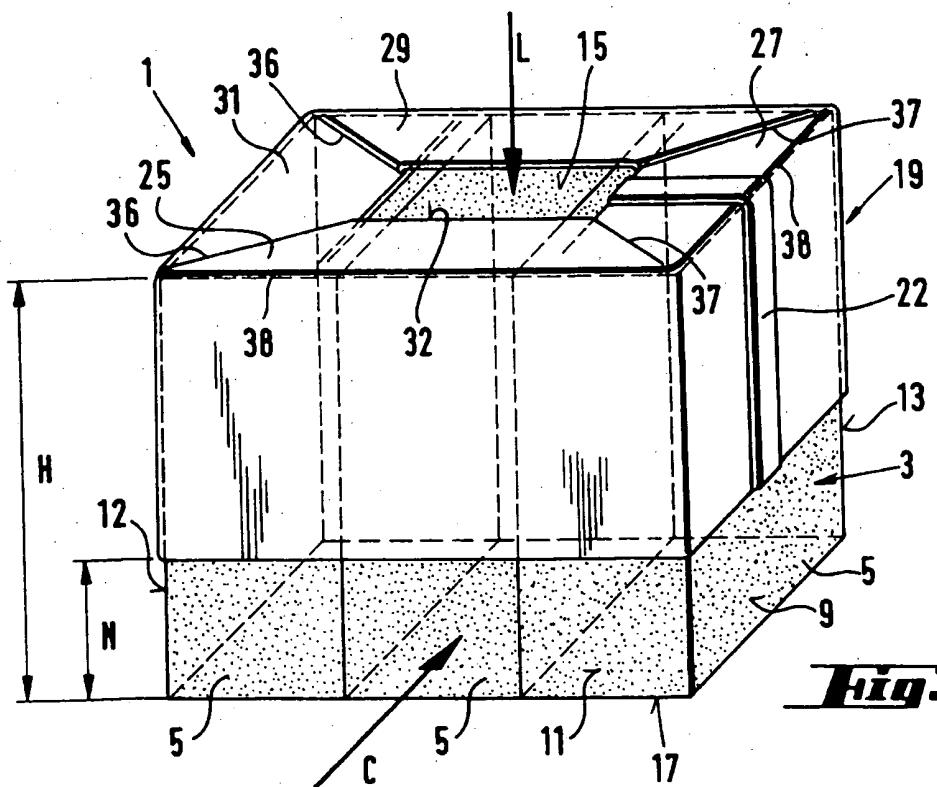


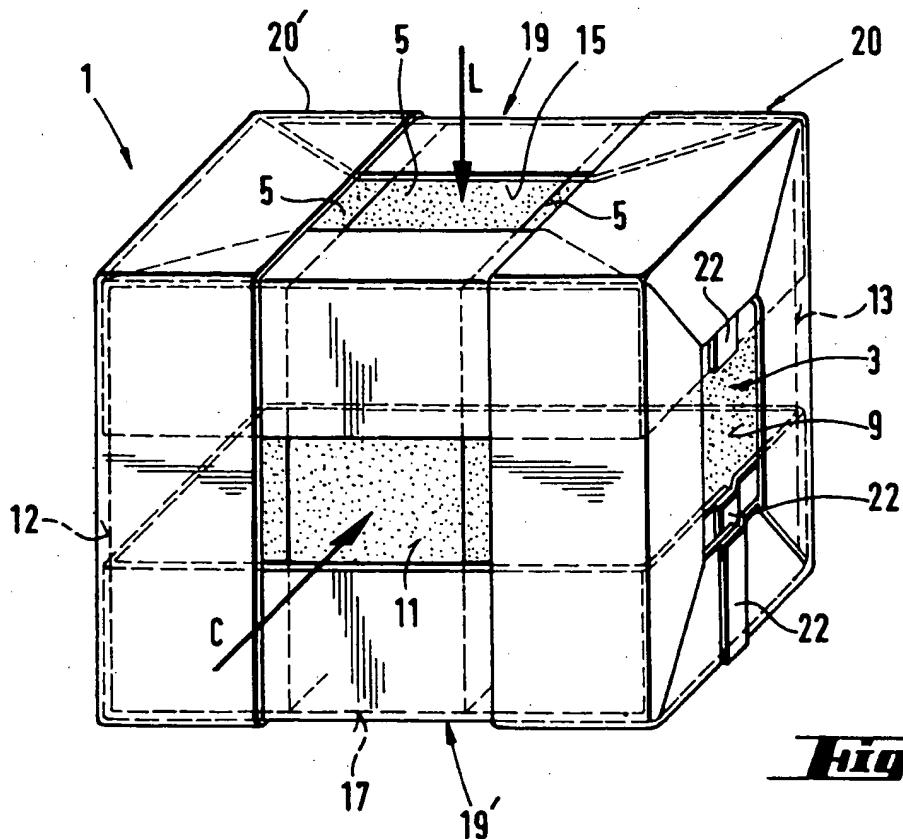
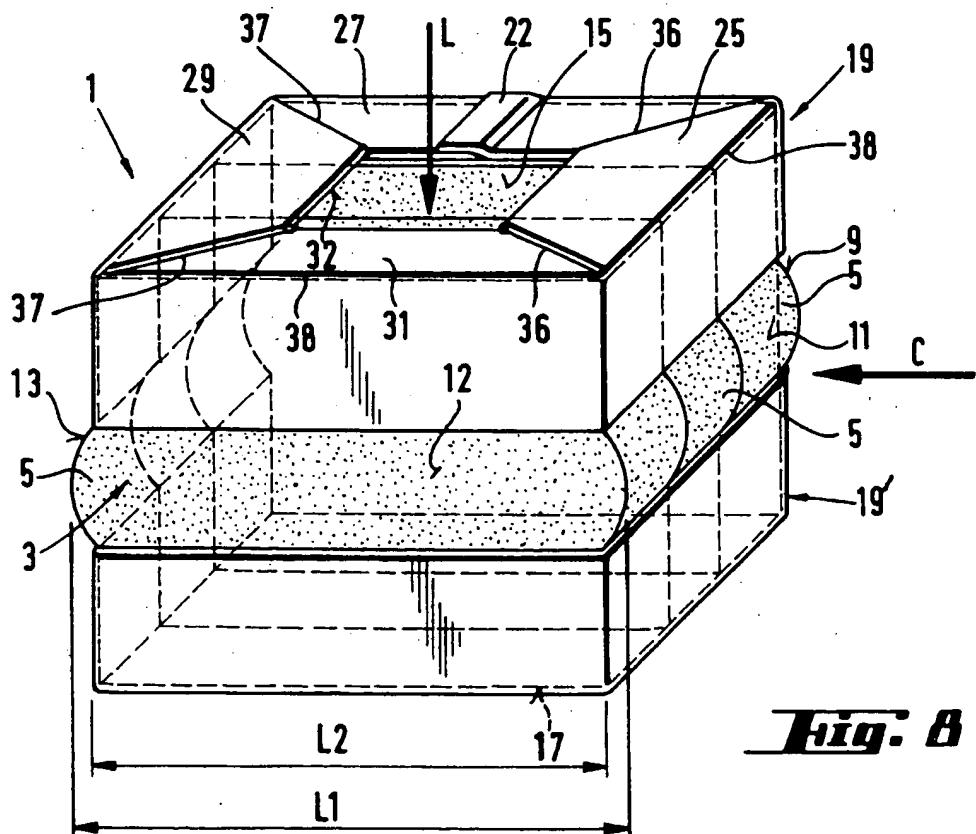
**Fig. 1**



**Fig. 2**





**Fig. 7****Fig. 8**



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## EUROPEAN SEARCH REPORT

Application Number

EP 95 10 8947

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.6)						
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim							
A	US-A-4 555 017 (BLACKMORE) * column 1, line 45 - line 60 * * column 2, line 6 - line 10 * * column 2, line 40 - line 43 * * column 2, line 58 - column 3, line 3; figure *	1	B65D71/00 B65D85/16						
D,A	WO-A-94 00362 (FATER S.P.A.) * figures *	1							
A	BE-A-797 431 (THE PROCTER AND GAMBLE COMPANY) * figures 1-4,7 *	1							
A	DE-A-41 06 972 (OLOFLEX FLEXIBLE SPEZIALFOLIE ) -----	1							
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)						
			B65D						
<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 34%;">Examiner</td> </tr> <tr> <td>BERLIN</td> <td>4 June 1996</td> <td>Spettel, J</td> </tr> </table>				Place of search	Date of completion of the search	Examiner	BERLIN	4 June 1996	Spettel, J
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